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DEVICE FOR MOUNTING A FUEL UNIT INSIDE A FUEL TANK
[VORRICHTUNG ZUR AUFNAHME EINES KRAFTSTOFFAGGREGATS INNERHALB EINES KRAFTSTOFFBEHÄLTERS]

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Description /1*

Prior Art

The invention concerns a device for mounting a fuel feed pump inside a fuel tank of the type indicated in the main claim.

Damping elements and mountings equipped therewith, which consist of rubber or fuel-resistant plastic and are appropriately anchored with the fuel tank, are already known for noise-damped installation of a fuel feed pump unit inside a fuel tank. These damping elements that lie in the fuel harden or swell greatly, as a result of which noise bridges could form over time. Further, the damping elements undergo changes in size, so that attempts have been made to compensate these changes by means of a complicated configuration of damping elements.

An arrangement for fuel feed pump units in a fuel tank is known from DE-A1 39 27 218, in which damping elements, which are made as hollow sections, are used for the mounting part. A unit holder is molded in one piece on a tank flange. This unit holder consists of two plate-shaped cross-pieces, the spacing of which is determined so that a unit carrier can be mounted between the cross-pieces with sufficient clearance. The damping elements made as hollow sections are provided lying between the cross-pieces, in order to make a low-noise installation possible.

*Numbers in the margin indicate pagination in the foreign text.

The complicated shape of these damping elements results in high manufacturing and assembly costs, which in particular are due to laborious techniques for connecting a plurality of individual parts in order to fasten the fuel feed pump unit in the fuel tank.

Advantages of the Invention

The device according to the invention, having the characterizing features of the main claim, results in a considerable reduction of costs for parts and testing, as well as simplification of assembly because of the one-part design. The risks that appear as a result of laborious connecting techniques for mounting damping elements can be eliminated in this way.

Integration of the holding function and vibration insulation for the fuel feed pump unit are provided simultaneously by the design of the holder according to the invention.

Advantageous configurations and further developments of the device are indicated in the dependent claims.

Drawing

A preferred embodiment of the invention is shown in the drawing and explained in greater detail in the following description. Here:

Fig. 1 shows a schematic front view of a holder according to the invention with a fuel feed pump unit,

Fig. 2 shows a schematic side view of the holder according to Fig. 1,

Fig. 3 shows a schematic cross-sectional representation of the holder along line III-III in Fig. 1 with a mold parting line,

Fig. 4 shows a schematic partial section of an alternative holder for securing the fuel feed pump unit,

Fig. 5 shows a schematic front view of an alternative embodiment of the holder shown in Fig.1,

Fig. 6 shows a schematic side view of the alternative embodiment in Fig. 5, and

Fig. 7 shows a schematic front view of a further alternative embodiment of the holder shown in Fig. 1.

Description of the Specific Embodiment

Figs. 1 to 3 show a holder 11 for receiving a fuel feed pump unit 12 and mounting it in a fuel tank, which is made as a one-piece injection-molded plastic part. This holder 11 can be made out of a fuel-resistant plastic, such as, for example, POM or the like. The fuel feed pump unit 12 includes a feed pump and a drive for the feed pump, which are mounted in a common housing.

The holder 11 has a tank flange 13, with which the holder 11 can be mounted in the fuel tank in mounting parts molded in the fuel tank for it. The tank flange 13 has a surrounding ring section 17 projecting radially outward and a collar 18 molded essentially at a right angle to the ring section 17, via which the tank flange 13 can be mounted in the fuel tank. As an alternative to the ring section 17 it is possible to provide at least one or more fastening straps or

the like distributed uniformly over the circumference. The tank flange 13 has an electric connecting element 19 for the energy supply and controlling the fuel feed pump 12. Further, a hydraulic connecting element 21 is made on the tank flange 13, for example as a connecting fitting, to which it is possible to connect a gasoline supply line, which leads to the internal combustion engine. For a specific application it is possible to provide on the tank flange 13 a further hydraulic connecting element 22 made, for example, as a connecting fitting, to which a return line may be connected. This hydraulic connecting element 22 is provided when the holder 11 is provided for an internal combustion engine with a recycled fuel injection system.

A mounting part 14 surrounding the fuel feed pump unit 12 is connected via first and second uncoupling elements 24, 27 with the tank flange 13 and is mounted axial to and separated from the latter. The axial separation takes place via first uncoupling elements 24, which are made as bars. In this case it is advantageous to provide three bars, which already make initial vibration insulation possible. An outer ring section 26, which surrounds the mounting part 14, is molded on one end of the bars 24 opposite the tank flange 13. The outer ring section 26 is interrupted in the area of bar 24'' in order to be able to remove hook 29 from the mold through wall 34.

The bars 24 mounted on the diameter of the outer ring section 26 are made as strips and can have an outer curvature corresponding to /2

the diameter. The outer ring section 26 is axially separated from the tank flange 13 by three bars 24, which are separated from one another at a 90° angle, a first and a third bar enclosing an angle of 180° and lying in a mold parting line, so that a simple and advantageous design of an injection mold is possible, as is discussed further below. In the case of using the holder 11 for a system with recycling to the supply tank, a bar 24' can be made tubular as a return pipe, respectively return line, for the fuel returned from the motor. Bar 24' also can be made as a strip, as are bars 24'' and 24''', if the holder 11 is used in a system without recycling.

Second uncoupling elements 27, which are made as cross-pieces mounted radial to a longitudinal axis of the mounting part, are provided between the outer ring section 26 and the mounting part 14. The cross-pieces 27 have an approximately S-shaped form, so that the torques generated by the fuel feed pump unit 12 at the time of switching the fuel feed pump unit on and off can be compensated by motor control, respectively by motor management, in which the S-shaped cross-pieces, that are made flexible as seen in the radial direction of motion of the mounting part, can receive and damp these torques. Therefore the cross-pieces 27 are made rectangular as seen in cross-section, the length extending in the axial direction of the longitudinal axis of the mounting part being a multiple of the width of the cross-pieces as seen in the radial direction.

The mounting part 14 is made as a tube or sleeve or the like, and advantageously can extend over 2/3 of the length of the fuel feed pump unit 12 and form a secure mounting part for the latter. A projection 28 pointing inward is made on the end [of the mounting part] pointing toward the tank flange 13 and thus forms an axial stop for the fuel feed pump unit 12. A locking connection 29 is provided on an end of the mounting part 14 lying opposite the stop 28. This connection is made as an axially extending strap 34, which extends in the direction to the lower end of the fuel feed pump unit 12 and on the free end of which there is a locking element 36, such as, for example, a locking hook, pin, or the like, for securing the fuel feed pump unit 12 in the mounting part 14. At the time of inserting the fuel feed pump unit 12 into the mounting part 14 the locking element 36 can be deflected in the radial direction and engage below with a lower edge of a suction fitting 32a mounted on the fuel pump feed unit as soon as the fuel feed pump unit 12 fits against the axial stop in the mounting part 14.

As an alternative to this, as is shown in Fig. 4, several straps 34 with locking elements 36 can be molded uniformly distributed over the circumference of the mounting part 14.

Fig. 2a shows an alternative configuration of the locking connection 29 given in Fig. 2. The mounting part 14 has a window 41, into which a locking element 36 of the filter part 32 engages, in the area of the suction fitting 32a in the strap 34. At the time of

mounting the filter part 32 the strap 34 can be deflected outward. The locking element 36 can be easily pushed because of its lead-in chamfer and come to fit in the window 41 and create a secure connection.

A filter 32, which is mounted near the bottom of the fuel tank at the time of installing the holder 11, as is shown in Fig. 4, is attached to the suction fitting 32a of the fuel feed pump unit 12. At the same time, the filter 32 can be secured to the fuel feed pump unit 12, respectively to the mounting part 14, which is made as a filter holding ring 33.

An upper part 50 of the filter 32 has upward projecting claws 51, which at least partially grip between the straps 34 of the locking connection 29, and at the same time the claws 51 fit against the free end of a section formed between them and separate the filter 32 from the locking connection 29.

In the assembled state, the filter holding ring 33 surrounds the straps 34 of the locking connection 29 with slight clearance and presses against the claws 51 of the upper part of the filter 50.

On the one hand, this secures the position of the filter holding ring 33, which is preliminarily attached by shoulders on the upper part of the filter 50, and, on the other hand, it prevents expansion of the straps, so that loosening of the fuel feed pump unit 12 from the mounting part 14 can be avoided.

A four-part injection mold is provided in order to make the holder 11 in one piece by means of injection molding. A first mold part has a first parting line 41, the course of which in the tank flange 13 and the bar 24' is shown with a dashed line. This first mold part is opened upwards in the axial direction of the holder 11.

Second and third mold parts, the parting line 42 of which lying in the axial direction is represented by a shaded area shown in Fig. 3, are provided for making the bars 24 as well as the electric and hydraulic connecting elements 19, 21 under the first parting line 41. The upper and lower side boundaries of the first and second mold parts, as seen in the axial direction are made, on the one hand, by the first parting line 41 of the first mold part, and by a third parting line 43 of the fourth mold part. This fourth mold part forms the outer ring section 26, the cross-piece 27, as well as the mounting part 14 and the locking connection 29. In order to remove the holder 11 from the mold this fourth mold part is opened downward, therefore in the direction opposite that of the first mold part, which is opened in the axial direction upward. The locking connection 29 with the strap 34 is formed by the second mold part and the fourth mold part, the inner area of the strap 34 being formed by the fourth mold part, the strap 34 being formed with forced removal from the mold only in the case of the embodiment according to Fig. 4.

In order to make a simple design of the second and third mold parts possible, the bars 24' and 24''' lie in the second parting line

42 and bar 24'' lies offset at an angle of 90° to the first or the third bars 24', 24'''. Further, the stop 28 on the mounting part 14 is formed by the fourth mold part.

Figs. 5 and 6 show an alternative configuration of a holder 11 for mounting the fuel feed pump unit 12. This embodiment deviates in its configuration of the second uncoupling element 27 and the design of the mounting part 14 from the holder 11 according to Figs. 1 to 3. /3 The remaining components of the holder 11 in Fig. 5 and Fig. 6 are structurally identical with those in Figs. 1 to 3.

The first and second uncoupling elements 24, 27 pass directly into one another, that is, U-shaped cross-pieces 27, which axially separate the mounting part 14 from the tank flange 13, are molded directly on bars 24. In this case the U-shaped cross-pieces 27 are mounted on bars 24' and 24''' lying in parting line 42 for a simpler configuration of the second and third mold part. Bar 24' is molded directly on the mounting part 14. The U-shaped cross-pieces 27 are made in such a way that the long arms arranged parallel to one another extend in the axial direction to the longitudinal axis of the mounting part 14. In this way the torques and vibrations that appear can be received and damped, respectively insulated with respect to the tank flange 13.

The mounting part 14 is made of half shells 37, lying opposite one another and offset from one another in the axial direction, which have a collar 38 pointing inward on their lower end. The fuel feed

pump unit 12 inserted from above into the mounting part 14 can fit against the lower collar 38 and thus is fastened in its position to the holder 11. A locking connection 29 with a strap 34 and a locking element 36, which secures the fuel feed pump unit 12 in the mounting part 14, can again be made lying opposite the collar 38.

The configuration of a holder 11 of this kind has the advantage that, if it is made as an injection-molded part, a three-part mold is sufficient to produce this holder 11 as an injection-molded part made in one piece. In this case a first parting line 41 (dashed line) lying in the tank flange 13 is provided, the first part of the mold, seen in the axial direction of the holder 11, being removed upward. The uncoupling elements 24, 27, and the mounting part 14 are essentially formed by a second and third mold, which has a second parting line 42, as essentially follows from Fig. 3.

Fig. 7 shows a further alternative embodiment of a holder 11 according to Fig. 1. The vibration insulation for this holder 11 is made only via a first uncoupling element 24, which is directly molded on the mounting part 14. In this way a simple embodiment can be made as compared with the configuration of the holder 11 described in Fig. 5 and Fig. 6. At the same time, the mold costs can be reduced, since the costs for making the cross-pieces 27 as second uncoupling elements can be eliminated.

Patent Claims

1. A device for mounting a fuel feed pump unit inside a fuel tank, in particular of motor vehicles, wherein the device is made as a holder (11) injection-molded out of plastic in one piece, having at least one mounting part (14) at least partially surrounding the fuel feed pump unit (12).

2. The device according to Claim 1, wherein the mounting part (14) of the fuel feed pump unit (12) separated axially from a tank flange (13) has uncoupling elements (24, 27).

3. The device according to Claim 2, wherein the mounting part (14) is separated from the tank flange (13) with at least one bar made as the first uncoupling element (24).

4. The device according to Claim 2 or 3, wherein cross-pieces made as second uncoupling elements (27) extending radially are mounted between the mounting part (14) of the fuel feed pump unit (12) and an outer ring section (26) connected with at least a first uncoupling element (24).

5. The device according to one of Claims 1 to 4, wherein a locking connection (29), which secures the fuel feed pump unit (12) at least in its axial direction to the mounting part (14), is mounted on the mounting part (14).

6. The device according to Claim 5, wherein the locking connection (29) has at least one strap (34) with a locking element (36) mounted on the free end thereof, which strap is blocked against

radial expansion by a holding ring (33) mounted on an upper filter part (50) of the preliminary screen (32).

7. The device according to one of Claims 1 to 6, wherein the mounting part (14) is made of at least two half shells (37) lying opposite one another and axially offset to one another.

8. The device according to one of Claims 1 to 3, wherein cross-pieces (27) made in U-form as second uncoupling elements are molded between the first uncoupling elements (24) and the mounting part (14).

9. The device according to Claim 2 wherein at least one bar made as a first uncoupling element (24) is made as a return line (22) for fuel returned into the fuel tank.

10. The device according to one of the preceding Claims, wherein the holder (11) is made as an injection-molded part with at least two mold parting lines (41, 42, 43).

11. The device according to one of the preceding Claims, wherein an electric connecting element (19) is molded onto the tank flange (13).

12. The device according to one of the preceding Claims, wherein a hydraulic connecting element (21) is molded onto the tank flange (13).

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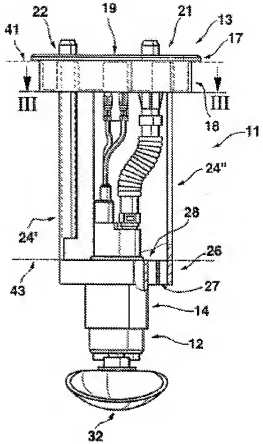
4 pages of drawings appended

Fig. 1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III
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24"
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24'
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43
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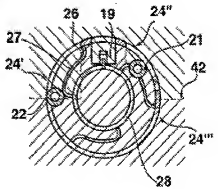
Fig. 3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24'''
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Fig. 2

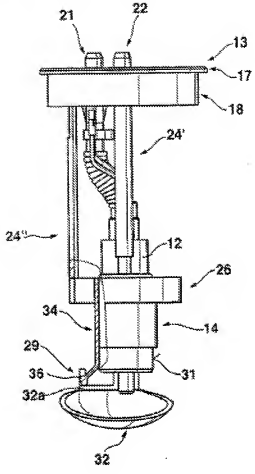
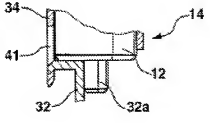


Fig. 2a



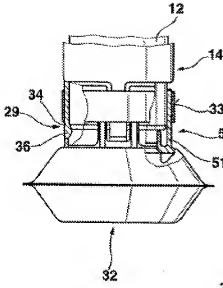

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Fig. 4

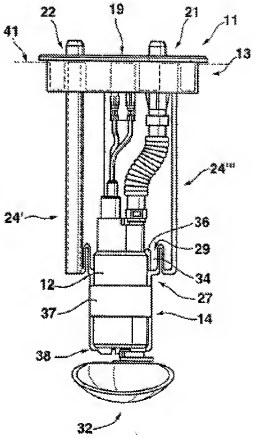
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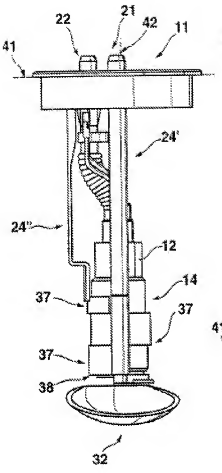
Fig. 5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24'
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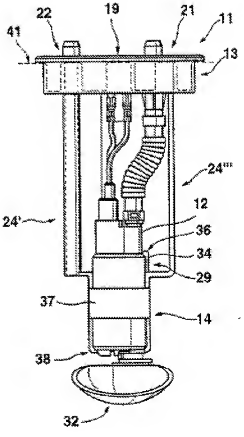
Fig. 6

Fig. 7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